

Duct Sealing

Overview

Duct systems carry cooled or heated air from your furnace or heat pump to rooms throughout your home. Washington State energy code requires that new duct systems are sealed, but there are no regulations around existing systems, which may have been poorly sealed, not sealed at all, or developed gaps overtime. Tightly sealing the joints and seams in ducts and air handlers ensures that all the conditioned air reaches the rooms rather than escaping into attics, crawlspaces and garages and it keeps out dust and other particulates from these spaces. Save money and keep your home clean and healthy by sealing or resealing your ducts.

Definitions

Conditioned air – Air that has been heated, cooled or dehumidified by a mechanical system.

Duct Leakage Test – Duct leakage can be tested using a calibrated fan and digital pressure gauge.

Duct Mastic – A low-cost, highly durable paste-like sealant used to seal leaks in a duct system.

Asbestos Tape – Fibrous tape, typically white, wrapped around joints on a metal duct system. Asbestos tape should NOT be disturbed – instead a professional can safely encapsulate it in duct mastic or remove it.

When is This Applicable?

If you are building a new home, duct leakage compliance, confirmed by testing, is required by code. When a central forced air system is altered by the installation or replacement of furnace, heat pump, air handler, coil or heat exchanger, the duct system that is connected to the new system must be tested. The test results must be provided to the building official and the homeowner. If the results fall short of the code target (see “Best Practices”), you may consider sealing your ducts to reap some of the numerous benefits listed below.

Duct systems in homes built before 2009 are generally not well sealed, unless the home was certified under Northwest Energy Star Homes, LEED for Homes or Built Green. If you have ducts that run through an unconditioned attic or crawl space, and don't have a good mastic seal on every joint and seam, there's a good chance you could benefit from sealing your ducts.



Duct leakage testing in a new home. Non-toxic smoke can be used to locate leakage areas, especially during framing in new construction. Source: O'Brien & Company.



What Makes it Green?

Sealing ducts, particularly those in attics and crawl spaces, is one of the most cost-effective ways to save energy and improve indoor air quality and thermal comfort. Here are some reasons why:

- Air you've paid to heat (or cool) is delivered to your rooms, rather than heating the attic or crawl space;
- The right amount of air is supplied to each space, maintaining comfort;
- Warm air leaking into cold spaces can lead to humidity and mold problems;
- Leaky return ducts can draw in poor-quality air from the attic, crawl space, or garage; and
- Northwest ENERGY STAR Homes, Built Green, and LEED for Homes have air sealing requirements and optional points available for exceeding those requirements.

Best Practices

In order to most effectively seal your ducts:

- Use water-based duct mastic for sheet metal ducts
- For flex duct, use appropriate Panduit straps (like big cable ties) – one to secure the inner liner to the duct terminal; another to secure insulation and outer cover over the inner liner

- Focus particularly on all joints at right angles and:
 - Where the filter rack sits in the plenum or trunk
 - Between trunks and branches
 - At elbows and “Y”s;
 - Between a duct and the boot that connects to the room register
- Seal the boots to the floor, wall or ceiling
- Discuss alternative sealing techniques (blown-in duct sealant) with a mechanical contractor.
- Temporarily remove any insulation from these fittings to expose the metal or flex duct liner

Wear proper protective equipment such as a dust mask and gloves. If you **suspect asbestos tape**, contact a certified asbestos abatement contractor immediately replace and re-secure insulation.

Go Further: While checking ducts, be sure to check for water pipe insulation as well. You can save water, energy, and money by insulating your water pipes (don't forget the corners where the pipe bends).



This metal duct elbow seam is properly sealed with duct mastic. If the ducts are in the crawl space, attic, or garage, they should be insulated after being well sealed. Source: O'Brien & Company.



Ducts Inside?

While most duct systems are located in attics, garages and crawlspaces, bringing ducts inside your home – by placing them in floor cavities or interior soffits - has many benefits including:

- Reducing the size and cost of furnace and ducts
- Reducing air leaks to the outside, which improves comfort and savings
- Improving indoor air quality

note if all your ducts are within the conditioned space, you are not required to test your ducts.

So how tight is tight?

Duct leakage targets are expressed as a flow rate (cubic feet per minute, or CFM) at a pressure of either 25 or 50 Pascals and are based on the square feet of area served by the system. The target for new construction is 0.06 x floor area served (in square feet), with the air handler installed ($0.04\text{CFM}_{25} \times \text{floor area}$, without the air handler).

Applicable References/ Standards

DPER Bulletin 36 Mechanical Permits FAQ :

Frequently asked questions on mechanical permits; heating, cooling, ventilation, refrigeration.

Residential Mechanical Permit Application /

Affidavit Form: Installer and equipment information. Permit fee schedule.

Unincorporated King County RESIDENTIAL CONSTRUCTION ENERGY COMPLIANCE

FORM: General disclosures on energy

performance, including duct systems in new homes and existing homes.

Washington State Energy Code Duct Testing Standard (RS-33)

Resources

For the complete King County Green Building Handbook and individual Green Sheet PDF files, please visit our website at: <http://kingcounty.gov/property/permits/publications/greenbuild.aspx>. For additional information, please email dperwebinquiries@kingcounty.gov or call 206-296-6600.

See these related DPER Green Sheets (GS):

- Air Sealing Your Home, GS Number 10
- Alternative Heating Systems, GS Number 19
- Fresh Air Ventilation, GS Number 14
- Furnace Replacement, GS Number 18
- Right Sizing Heating/Cooling Systems, GS Number 17
- Routine Maintenance, GS Number 5

Insulation instant rebates from Puget Sound Energy; Performance-tested duct sealing: Suite of rebates related to ducts, duct sealing, and duct insulation.

2012 Energy Code Related Documents: This WSU Extension Energy Program website provides numerous links to related documents, including Duct Testing Standard and presentations.

Puget Sound Clean Air Agency's Asbestos Resources: This site provides resources related to asbestos, and a reminder that “anyone who works or has the potential of working with products containing asbestos must fully comply with all regulatory requirements.”

